

ACRYLIC ACID

Acrylic acid is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 79-10-7

$\text{CH}_2=\text{CHCO}_2\text{H}$

Molecular Formula: $\text{C}_3\text{H}_4\text{O}_2$

Acrylic acid is a corrosive, colorless liquid with an acrid odor. It is miscible with water, alcohol, ether, benzene, chloroform, and acetone. It polymerizes readily in the presence of oxygen (Merck, 1989). Exothermic polymerization at room temperature may cause acrylic acid to become explosive if confined. It is also a fire hazard when exposed to heat or flame (Sax, 1989).

Physical Properties of Acrylic Acid

Synonyms: vinylformic acid; propenoic acid; ethylene carboxylic acid; acroleic acid; propene acid; 2-propenoic acid

Molecular Weight:	72.06
Boiling Point:	141.0 °C
Melting Point:	14.0 °C
Flash Point:	68 °C (155.0 °F) (open cup)
Vapor Density:	2.45 (air = 1)
Density/Specific Gravity:	1.0511 at 20/4 °C
Vapor Pressure:	3.1 mm at 20 °C
Log Octanol/Water Partition Coefficient:	0.36
Conversion Factor:	1 ppm = 2.95 mg/m ³

(Merck, 1989; HSDB, 1991; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Acrylic acid is emitted from the production of acrylic acid and acrylate. Exposure to acrylic acid can occur from the use of polishes, paints, coatings, rug backings, adhesives, plastics, textiles, and paper finishes. It is also detected, in trace amounts, in commercial propionic acid (HSDB, 1991). Eighty percent of the acrylic acid that is produced is used as an intermediate for acrylate esters (Howard, 1990). The primary stationary sources that have reported emissions of

acrylic acid in California are manufacturers of guided missiles and space vehicles, and electronic components and accessories (ARB, 1997b).

Acrylic acid was registered for use as a pesticide, however as of December 31, 1991, it is no longer registered for pesticidal use in California (DPR, 1996).

B. Emissions

The total emissions of acrylic acid from stationary sources in California are estimated to be at least 4 pounds per year, based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Acrylic acid is produced naturally in marine algae and in the rumen fluid of sheep (Howard, 1990).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient concentrations of acrylic acid.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of acrylic acid was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Acrylic acid exists in the atmosphere in the gas phase. The dominant atmospheric loss process for acrylic acid is by reaction with the hydroxyl radical. Based on this reaction, the atmospheric half-life and lifetime of acrylic acid is estimated to be about 1.5 days and 2 days, respectively. Wet and dry deposition of gaseous acrylic acid may also be important (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Acrylic acid emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to acrylic acid are inhalation, ingestion, and dermal contact (U.S. EPA, 1994a).

Non-Cancer: Inhalation exposure may cause irritation of the skin, eyes, nose, and throat.

The United States Environmental Protection Agency (U.S. EPA) has established a Reference Concentration (RfC) for acrylic acid of 1×10^{-3} milligrams per cubic meter based on degeneration of the nasal olfactory epithelium in mice. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic non-cancer effects. The U.S. EPA has also established an oral Reference Dose (RfD) of 0.5 milligrams per kilogram per day for acrylic acid based on reduced pup weight in rats. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects (U.S. EPA, 1994a).

In animal reproductive studies, mixed results have been reported ranging from no adverse effects to decreased body weight gain and decreased fertility (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of acrylic acid in humans. Both positive and negative results have been reported in animal studies. The U.S. EPA has not classified acrylic acid for carcinogenicity (U.S. EPA, 1994a). The International Agency for Research on Cancer has placed acrylic acid in Group 3: Not classifiable (IARC, 1987a).

